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(54) Title: GLYCOLIPID/MPG GELS

(57) Abstract

This invention relates to an environmental friendly detergent composition useful in a gel for cleaning hard surfaces comprising glycolipid and polyalcohol.

GLYCOLIPID/MPG GELS

FIELD OF INVENTION

This invention relates to an environmental friendly detergent composition useful in a gel for cleaning hard surfaces.

BACKGROUND OF THE INVENTION

In industry hard surface cleaning has traditionally been carried out by high pressure foam cleaning. There are some severe safety and environmental problems by using high pressure foam cleaning such as high pH, aggressive cleaning agents, high water consumption, aerosol formation and mechanical noise.

To overcome these safety and environmental problems much effort has been put into developing different hard surface cleaners in the form of gels. The gel cleaners have the advantages of giving no or insignificant aerosol formation, they have a low water consumption, and they are easy to apply: Prior to dilution the gel compositions are readily mobile liquids which are convenient for transport etc., but when diluted to working concentrations they start to thicken to a gel-like consistency, which mean that they will remain in contact with the surface or object to be cleaned for sufficient time to enable the cleansing to occur (for reference see EP 0 314 232), so if the detergents of the gel composition are environmental friendly, the gel application method is a very safe and gentle way of cleaning hard surfaces.

The cleaning gel compositions proposed until now have contained surfactants, builders and thickeners (see Research Disclosure 34045, August 1992/619), the surfactants e.g. being benzene or naphthalene sulphate or sulphonate derivatives (see EP 0 314 232), so there is a need for "more green" detergent gel compositions.

SUMMARY OF THE INVENTION

In this invention it is surprisingly found that a gel can be made of very environmental friendly chemicals, namely glycolipid, polyalcohols and water.

Accordingly, the present invention relates to a liquid detergent composition which undergoes a viscosity increase upon aqueous dilution, comprising

a) one or more glycolipids

b) one or more polyalcohols

c) water.

DETAILED DISCLOSURE OF THE INVENTION

In this invention it is surprisingly found that a gel cleaning composition can be made of glycolipid(s), polyalcohol(s) and water.

According to the invention the glycolipid may be a sugar or sugar alcohol fatty acid ester (as described in JP 63-112,993) or a derivative thereof or a fatty acid monoester or a mixture of fatty acid monoesters of alkylglycoside (as described in US 5,191,071 and in US 5,200,328) or a derivative thereof. In particular the glycolipid is a fatty acid monoester of ethylglycoside, the fatty acid containing 8-22 carbon atoms, e.g. ethyl 6-O-dodecanoyl glucoside.

According to the invention any polyalcohol which has two or more hydroxyl groups may be used in making the gel. Useful examples are 1,2-ethanediol, 1,2-propandiol, 1,3-propandiol, 1,2,3-propantriol, butanediols, butanetriols, pentanediols, and sugar alcohols. In particular 1,2-propandiol is preferred.

The gel composition may optionally also contain other detergent ingredients such as solvents and sequestrants.

The gel composition may also contain an electrolyte (e.g. sodium chloride). It has been found that sodium chloride should be added in more than 8 % w/w in order to maintain the gel formation when the gel components are ethyl 6-O-dodecanoyl

glucoside, 1,2-propandiol and water (in lower concentrations the g l formation decreases, for reference see Example 1).

The gel composition may also contain one or more enzymes. The enzymes are in particular proteases (for instance Savinase® 16.0 L, Alcalase® 2.5 L, Esperase® 8.0 L or Durazym™ 16.0 L, all available from Novo Nordisk A/S), amylases (for instance Termamyl® 300 L available from Novo Nordisk A/S), lipases (for instance Lipolase® 100 L available from Novo Nordisk A/S) or cellulases (for instance Celluzyme™ 1.0 L available from Novo Nordisk A/S). The amount of enzyme may be dosed so that the percentage of enzyme in the finished gel will be of 0.001-10%, preferably 0.01-1%, in particular about 0.01-0.5%.

Gel Making in situ

The gel is made in situ. The detergent composition comprising the glycolipid(s) and the polyalcohol(s) are diluted with water and applied to the soiled surfaces by using some kind of application system (e.g. diluted through a venturi and applied via a special lance). The detergent composition is best applied using gel generation equipment which automatically draws in the required percentage. The required percentage of a given glycolipid and a given polyalcohol may be found as described in Example 1. Application equipment is available from for instance Scanio A/S, Blytaekkervej 4-6, DK-9000 Aalborg, Denmark.

Cleaning Hard Surfaces

The gel is applied to the soiled surfaces as described above. The gel will set on the surfaces within a few seconds. The gel will remain in its form even on complicated shaped equipment, vertical surfaces and ceilings and will therefore give very long contact times. Dwell times are difficult to estimate beforehand and should be determined by trial. A dwell time of 5-30 minutes may often be required.

After a sufficient dwell time to allow for surfactant action the gel composition is rinsed off using a washing system. In some cases it may be necessary to use a pressure

washing system to rinse off the gel composition, but often removal by gentle flushing with water is easy and all that is needed.

Potential Applications

The cleaning gel detergent described in this invention may be used in all kinds of industries: in dairies, in slaughterhouses, in breweries, in sea food production units etc. It may also be used in the transport sector, for instanc as a cleaning agent in car washing and for general vessel wash. Especially, the cleaning gel may be useful in removing oils (vegetable, animal and mineral). It may also work as a general purpose cleaner in households, e.g., for cleaning windows, bathrooms and kitchens, in particular it may be useful as an efficient oven cleaner. It may also be useful for janitorial purposes such as computer cabinet cleaning etc.

The cleaning gel of the present invention may also be very useful for personal care purposes, in skin, hair and dental applications, such as cleaning dentures.

The invention is further illustrated in the following example which is not intended to be in any way limiting to the scope of the invention as claimed.

EXAMPLE 1

Ethyl 6-O-dodecanoyl glucoside/1,2-propandiol/water gel

Different formulations were made by mixing warm (about 55°C) ethyl 6-O-dodecanoyl glucoside with 1,2-propandiol. (The temperature of the glycolipid should be chosen so it is possible to mix the glycolipid with the polyalcohol). Each formulation was then diluted with cold water in the interval of from 0 to 90% w/w, mixed on a whirler, and the rheology of each gel was visually evaluated. After 5 minutes the gel was transferred to a Haake viscosimeter (Haake Rotovisco, RV 3, with the sensor system MV I, operated according to Manu-

facturer's instructions), and the visc sity was measured at several shear rates (after the bubbles had disappeared).
All measurements were made at room temperature.
The formulations tested and the achieved results are listed in Table 1 (see below).
Influence of NaCl (0-8%) was also tested, by mixing with cold NaCl-solutions, instead of cold water. The results are listed in Table 2 (see below).

Results and discussion:
The formulations prepared do not exhibit newtonian behaviour, so the viscosities of different gels are only comparable when measured at the same rotation speed. The preferred ratio between ethyl 6-O-dodecanoyl glucoside and 1,2-propandiol is 80/20. Formulation no. 2 in Table 1 is clear and has an acceptable low viscosity, like a detergent, and the formulation gives good gels when diluted to a maximum of 80% water (see no. 3 to no. 7 in Table 1).

Influence of NaCl: It can be seen from Table 2 that a NaCl-concentration from about 0.2% lowers the viscosity significantly. It can also be seen that if the gels have to contain NaCl, a concentration of about 8% is needed to maintain the viscosity (compared with no added NaCl). At none of the NaCl-concentrations tested could an increase in the viscosity be measured.

TABLE 1: "GEL"-FORMULATIONS (Based on % W/W)

NUMBER	6-O-DODECANOYL GLUCOSIDE %	1.2 PRO-PANDIOL %	H_2O %	Visually Judgement	Viscosity (cP) n=8 rpm	Viscosity (cP) n=32 rpm
1	80	20	0	++++	>16500	>4125
2	60	15	25	++	2063	2112
3	40	10	50	++++	>16500	>4125
4	32	8	60	++++	10808	>4125
5	24	6	70	+++	5198	2001
6	20	5	75	++++	5115	1931
7	16	4	80	++	1683	1134
8	8	2	90	+	363	243
9	60	40	0	+++	8234	>4125
10	45	30	25	++	1139	1109
11	30	20	50	+	132	120
12	24	16	60	+	0	41
13	18	12	70	+++	1205	532
14	15	10	75	++	1848	825
15	12	8	80	++	528	400
16	6	4	90	+	0	50
17	40	60	0	++	2013	2112
18	30	45	25	++	479	458
19	20	30	50	+	33	87
20	16	24	60	+	0	50
21	12	18	70	++	363	404
22	10	15	75	+	726	338
23	8	12	80	++	644	462
24	4	6	90	+	33	50
25	20	80	0	+	875	866
26	15	60	25	+	132	215
27	10	40	50	+	17	58
28	8	32	60	+	0	29
29	6	24	70	+	0	8
30	5	20	75	+	17	33
31	4	16	80	+	66	128
32	2	8	90	+	0	21

++++ = thick "gel"
+++ = "gel"
++ = thin "gel"
+ = like water

TABLE 2: "GEL"-FORMULATIONS with NaCl (Based on % W/W)

NUMBER	6-O-DODECANOYL GLUCOSIDE %	1.2 PRO-PANDIOL %	NaCl %	Visually Judgement	Viscosity (cP) n = 8 rpm	Viscosity (cP) n = 32 rpm
1	32	8	0	++++	10527	>4125
2	32	8	0.15	++++	5082	2747
3	32	8	0.6	++++	5610	2970
4	32	8	3	++++	6848	3630
5	24	6	0	++++	5115	2071
6	24	6	0.175	++	1370	1370
7	24	6	0.7	++	3135	2178
8	24	6	3.5	++++	4488	2104
9	18	12	0	++	2228	1217
10	18	12	3.5	++	1799	1110
11	18	12	7	++	2178	1205
12	16	4	0	++	2558	unstable
13	16	4	0.2	+	132	50
14	16	4	0.8	+	83	50
15	16	4	4	++	1402	unstable
16	12	8	0	++	1353	813
17	12	8	4	+	693	413
18	12	8	8	++	1040	722
19	10	15	0	++	842	474
20	10	15	3.75	++	528	474
21	10	15	7.5	++	627	421
22	8	2	0	+	314	227
23	8	2	0.225	+	17	21
24	8	2	4.5	+	17	12
25	4	16	0	+	83	74
26	4	16	4	+	17	33
27	4	16	8	+	66	87

++++ = thick "gel"
+++ = "gel"
++ = thin "gel"
+ = like water

The Claims defining the invention are as follows:

1. A method of making a gel *in situ* comprising a liquid detergent comprising incorporating into a material to be gelled

   a) one or more glycolipids

   b) one or more polyalcohols

   c) water,

wherein the glycolipid is a sugar fatty acid ester, a derivative of a sugar fatty acid ester, a sugar alcohol fatty acid ester, a derivative of a sugar alcohol fatty acid ester, a fatty acid monoester of an alkylglycoside or a derivative of a fatty acid monoester of an alkylglycoside.

2. The method according to claim 1, wherein the glycolipid is a fatty acid monoester of ethylglycoside, the fatty acid containing 8-22 carbon atoms.

3. The method according to claim 2, wherein the glycolipid is ethyl 6-O-dodecanoyl glucoside.

4. The method according to any one of claims 1 to 3, wherein the polyalcohol is a diol.

5. The method according to claim 4, wherein the diol is selected from the group consisting of ethanediol, propandiol, butanediol and propanediol.

6. The method according to claim 5, wherein the diol is 1,2-propandiol.

7. A method of making a gel *in situ*, substantially as hereinbefore described with reference to any one of the Examples.

8. A gel formed by the method of any one of claims 1 to 7.

Dated 20 May, 1997
Novo Nordisk A/S

Patent Attorneys for the Applicant/Nominated Person
SPRUSON & FERGUSON

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 95/00432

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: C11D 1/66, C11D 17/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, CA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0499434 A1 (UNILEVER PLC ET AL), 19 August 1992 (19.08.92), page 9, line 2 - line 10, claims 1 and 14, abstract --	1-5
Y	WO 9213055 A1 (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN), 6 August 1992 (06.08.92), page 3, line 20 - line 21; page 4, line 1 - line 3, abstract --	1-5
A	EP 0491532 A1 (UNILEVER PLC ET AL), 24 June 1992 (24.06.92) -- --------	1-5

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 February 1996	21.02.96
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile N . +46 8 666 02 86	Authorized officer Dagmar Järvman Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information n patent family members

05/02/96

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0499434	19/08/92	SE-T3- 0499434	
		CA-A- 2060698	13/08/92
		DE-D,T- 69203473	11/01/96
		JP-A- 5059394	09/03/93
		US-A- 5417879	23/05/95
WO-A1- 9213055	06/08/92	DE-A- 4102502	30/07/92
		EP-A- 0569376	18/11/93
		JP-T- 6504557	26/05/94
EP-A1- 0491532	24/06/92	JP-A- 4300999	23/10/92